PRELIMINARY RESULTS OF DRYLAND TARO SPACING AND FERTILIZER TIMING

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Abstract

Five plant spacing treatments and four fertilizer timing treatments were applied to Chinese taro grown for 9 months on land previously cropped to edible ginger. From our preliminary interpretation of the results, a 1 x 3 or 1 x 4 plant spacing appears to be the most appropriate. There were no differences between the fertilizer timing treatments, indicating that total fertilizer requirements can be applied early in the growth cycle of taro.

Pre-Plant Soil Analysis

The pre-plant soil analyses for both the taro spacing and fertilizer timing experiments are listed below in Table 1. Both experiments were conducted in the same vicinity and therefore the soil nutrient profiles were expected to be very similar. Edible ginger was grown previously to the taro experiments and therefore levels of phosphorus and calcium were high. We considered the starting phosphorus and calcium levels to be adequate and therefore only with 695 lbs urea per acre and 630 lbs muriate of potash per acre were applied in both experiments.

Table 1. Pre-plant Soil Analysis

	Spacing Test	Timing Test
pH	6.12	6.29
P ppm	281.0	291.7
K ppm	71.3	70.0
Ca ppm	1,353.3	1,460.0
Mg ppm	69.0	76.7

Taro Spacing

This test was done to determine an appropriate spacing pattern or planting density for dryland taro. The planting date was August 1988 and Chinese taro was grown for 9 months before harvesting. The plant spacing treatments and averaged results are listed in Table 2. The average weight per plant (2.47 to 3.99 lb) and percent no. 1 corms (67 to 97 %) increased as plant density decreased. Conversely, yield per acre decreased (36,145 to 21,159 lb) as plant density decreased.

Table 2. Taro Plant Spacing and Yield of No.1 Corms

			Average:	
Treatment	Plants/Acre	Lb/Plant	% No.1	Yield/Acre
2 x 4 ft	5,445	3.99	97	21,159
1 x 4 ft	10,890	3.01	87	28,159
1 x 3 ft	14,520	2.57	76	28,488
1x1 x 4 ft	17,424	2.55	71	31,812
0.5 x 4 ft	21,780	2.47	67	36,145

The no.1 taro corms were identified as corms which were greater than 1.25 lb and without any rot. Of the corms not identified as being no.1, most of them were not rotten but undersized. Figure 1 shows the average yield per acre for each treatment and Figure 2 shows the predicted yield per acre. Figure 3 shows the average weight per plant for each treatment and Figure 4 shows the predicted weight per plant. Both predicted yield and weight per plant had a straight line relationship to plant spacing.

Discussion on Plant Spacing

The proper plant spacing for a particular farm operation would not only depend on the final yield per acre but on other decision factors. These could be the type of tractor equipment a farmer chooses to use, the uniformity of individual corm size to meet the demand of the type of market (retail, restaurant, supermarket, chipping, etc.), the weed maintenance program, the amount of hulis a farmer needs to prepare for an acre, and the time of year that a field is planted.

Considering that most farmers use a hand drawn tiller to cultivate rows, a spacing of 1 x 3 to 1 x 4 feet would be appropriate. The approximate yield of no.1 corms per acre would be about 28,000 lb with an individual corm size of about 3 lb. The percentage of no.1 corms would probably range in the 80 percent range which is considered good. Weeding would be required 2 or 3 times during the early growth stages. Approximately 12,000 hulis would be required for an acre and this is considered a reasonable proportion.

The wider spacing treatments yielded very high averages of percent no.1 corms, while the closer spacing treatments yielded very low averages of percent no.1 corms. Taro is commonly known to be a poor competitor in culture and a low amount of sunlight interception per plant observed in the early growth stage of taro is suspected as a limiting factor for attaining the best level of percent no.1 corms. We suggest that farmers consider planting with a wider spacing during the winter months and a narrower spacing during the summer months to optimize quality and production.

Fertilizer Timing

This test was done to determine the best frequency of fertilizer application for dryland taro. All fertilizer timing treatments received the same amount of total fertilizer per crop (695 lb urea per acre and 630 lb muriate of potash per acre) but applied at different rates by month. The plant spacing used was 1 x 3 feet. The planting date was late September 1988 and Chinese taro was grown for 9 months before harvesting. The averaged results of no.1 corms are listed in Table 3. Figure 5 is a graph of the yield per acre of no.1 corms vs fertilizer timing.

The results show that there were no differences between the fertilizer timing treatments as measured in lb per plant, % no.1 corms, and yield per acre. The percent no.1 corms were all very low and this probably affected the final yield. Again the corms not identified as no.1 were undersized rather than rotten.

Table 3. Fertilizer Timing and Yield of No.1 Corms

		Average:	
Treatment[1]	Lb/Plant	% No.1	Yield/acre
Planting	2.43	68	23,969
p 2 4	2.48	60	21,724
p 1 3 5	2.37	66	23,004
p 1 2 3 4 5	2.47	65	23,422

[1] Planting = all fertilizer applied at planting. p 2 4 = total amount of fertilizer was applied 3 times; at planting, 2 months after planting, and 4 months after planting, etc.

Discussion on Fertilizer Timing

Results indicate that for land previously cropped to edible ginger, total applications of nitrogen and potassium can be applied early in the crop growth cycle. A follow-up test is being planned but on non-ginger cropped land to see if significant differences from different fertilizer increments can be demonstrated.

The yields and percent no.1 corms for this experiment, although planted in the same location as the spacing test, were very much lower. Several factors may have contributed to the depressed yields. One is the later season in which the timing test was planted. There was a steeper drop in temperature early in the crop at the onset of the winter months but from other tests with even lower starting temperatures, yields were approximately 30,000 lb per acre.

Another seasonal factor, although not measured, may have been the amount of shade or sunlight plants received during the cropping period. The average percent no.1 corms as seen in the timing test (65%) were very close to the average percent no.1 corms in the densest spacing treatment (67%) which probably received the most shade. As suspected from the spacing test, the amount of sunlight interception per plant

in the early growth stages of taro may probably be one of the major limiting factors for optimal percent no.1 corms.

Another possible factor was the source of hulis used in planting the different tests. In our spacing test, all the hulis came from our propagation nursery in which we kept up fertility levels and weed control. The hulis used to plant the fertilizer timing test were obtained from a farmers field which was kept weed free but not fertilized. The nutritional pre-disposition of the planting material may also be part of the reason for having low or high yields.

References

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Reynolds, S.G. and P. Netram. 1977. The Effect of Rainfall and Time of Planting on Yield of Taro in Western Samoa. Proc. of the 3rd Symp. of the Int. Soc. for Tropical Root Crops. Ed. Colin L.A. Leakey, pp 374-376.

Sivan, P. 1977. Effects of Spacing in Taro. Proc. of the 3rd Symp. of the Int. Soc. for Tropical Root Crops. Ed. Colin L.A. Leakey, pp 377-381.

Figure 1.

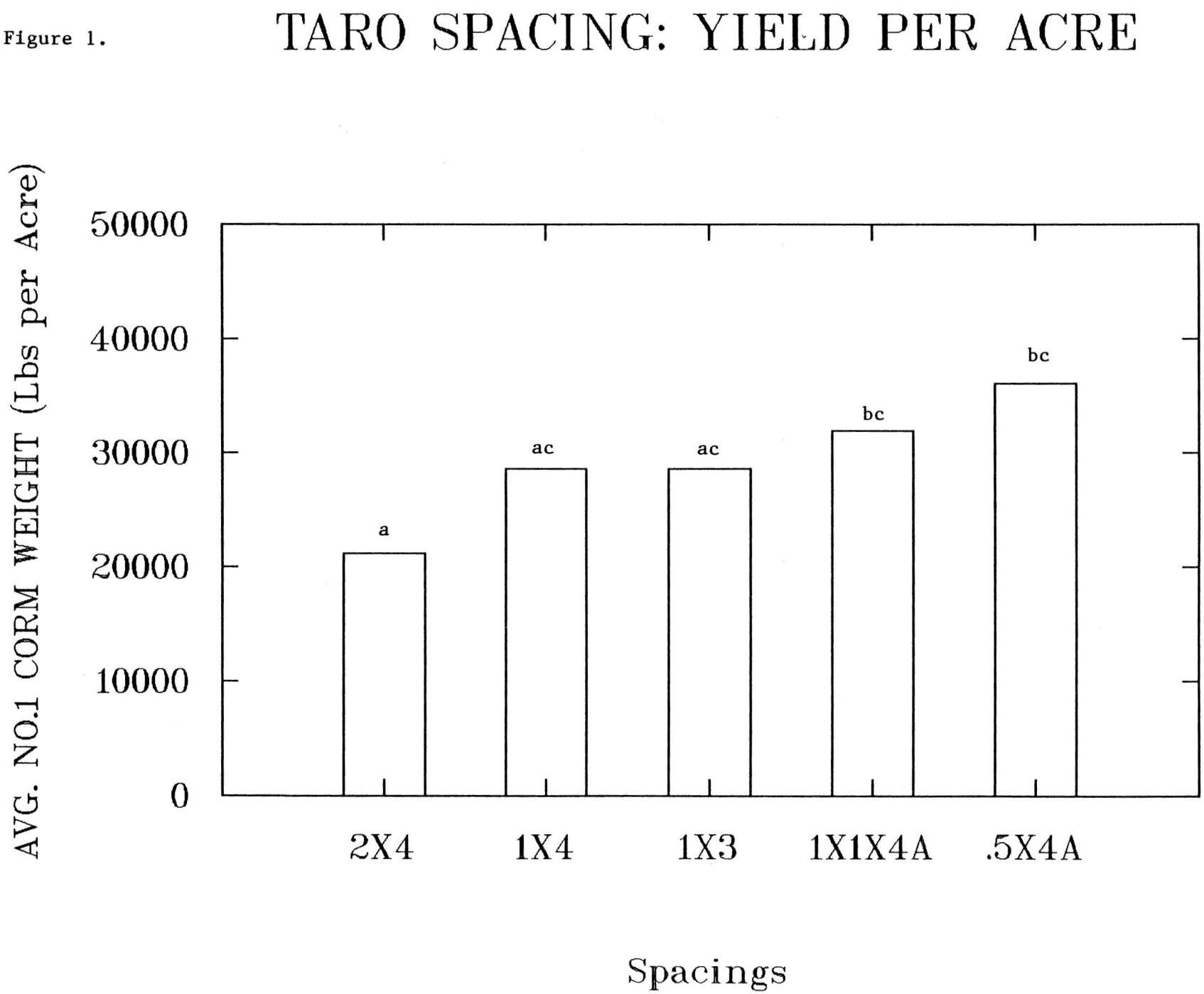

TARO SPACING: YIELD PER ACRE
AVG. NO.1 CORM WEIGHT (Lbs per Acre)
50000
40000
30000
20000
10000
0
a
ac
ac
bc
bc
2X4
1X4
1X3
1X1X4A
.5X4A
Spacings

Figure 2.

Predicted Yield per Acre vs Plant Spacing

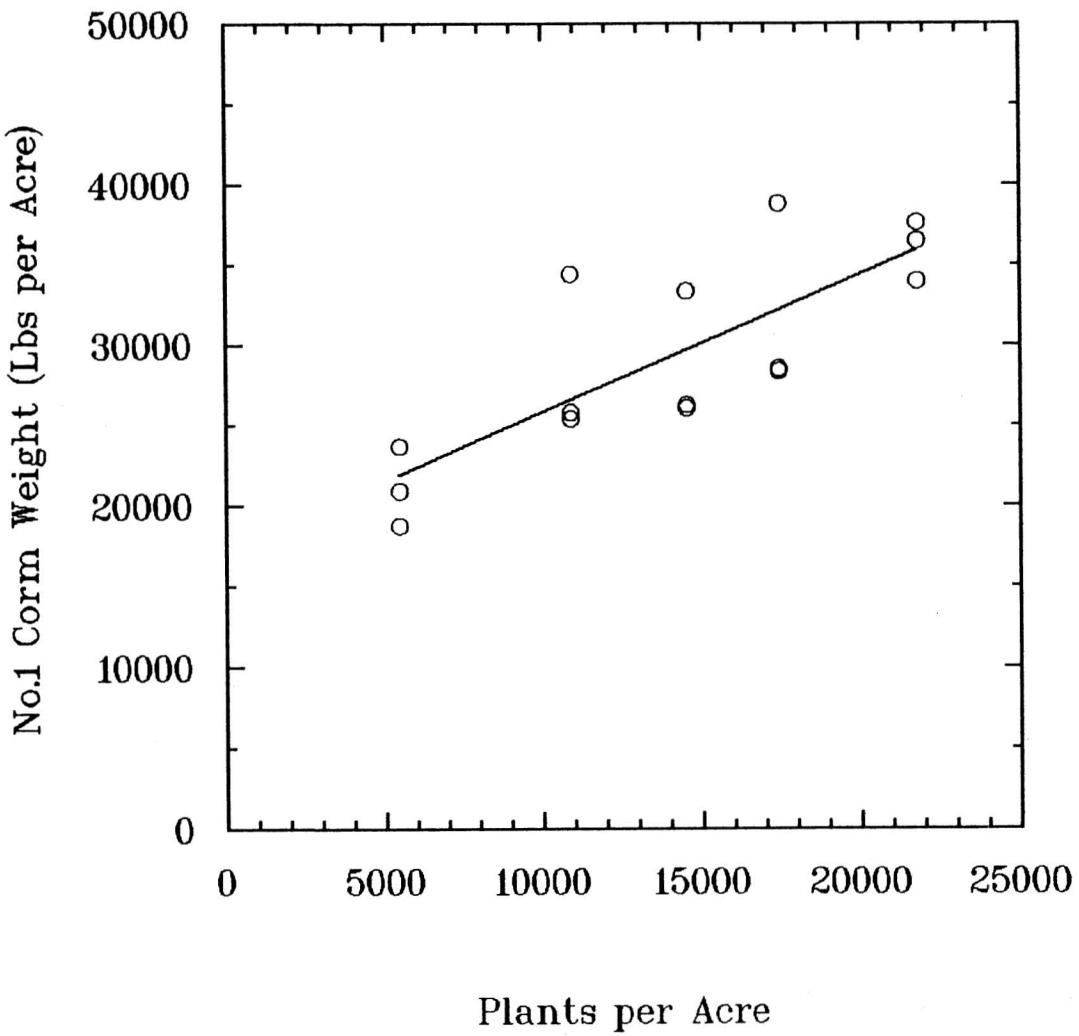


Figure 3.

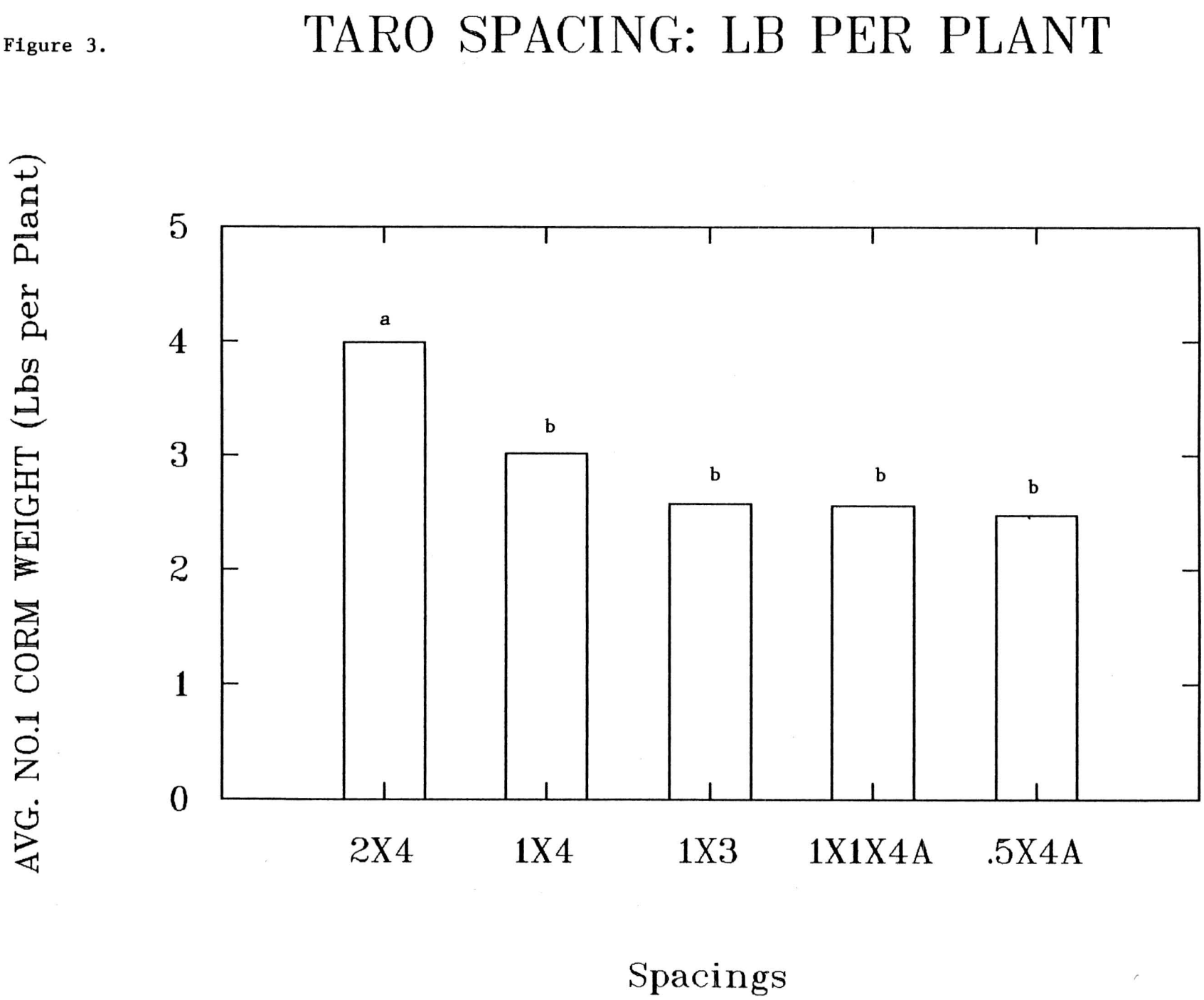

TARO SPACING: LB PER PLANT
AVG. NO.1 CORM WEIGHT (Lbs per Plant)
0
1
2
3
4
5
a
b
b
b
b
2X4
1X4
1X3
1X1X4A
.5X4A
Spacings

Figure 4.

Predicted No.1 Corm Weight per Plant vs Plant Spacing

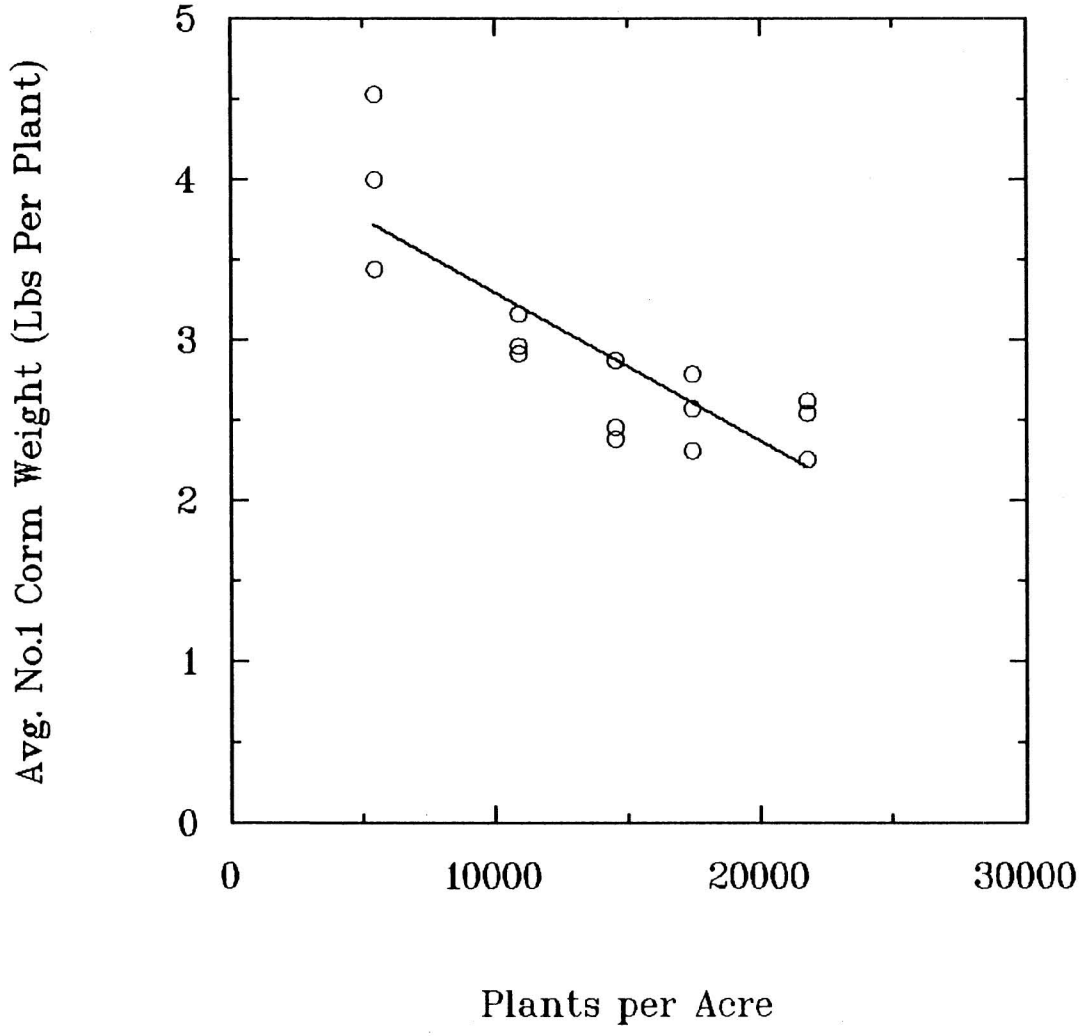
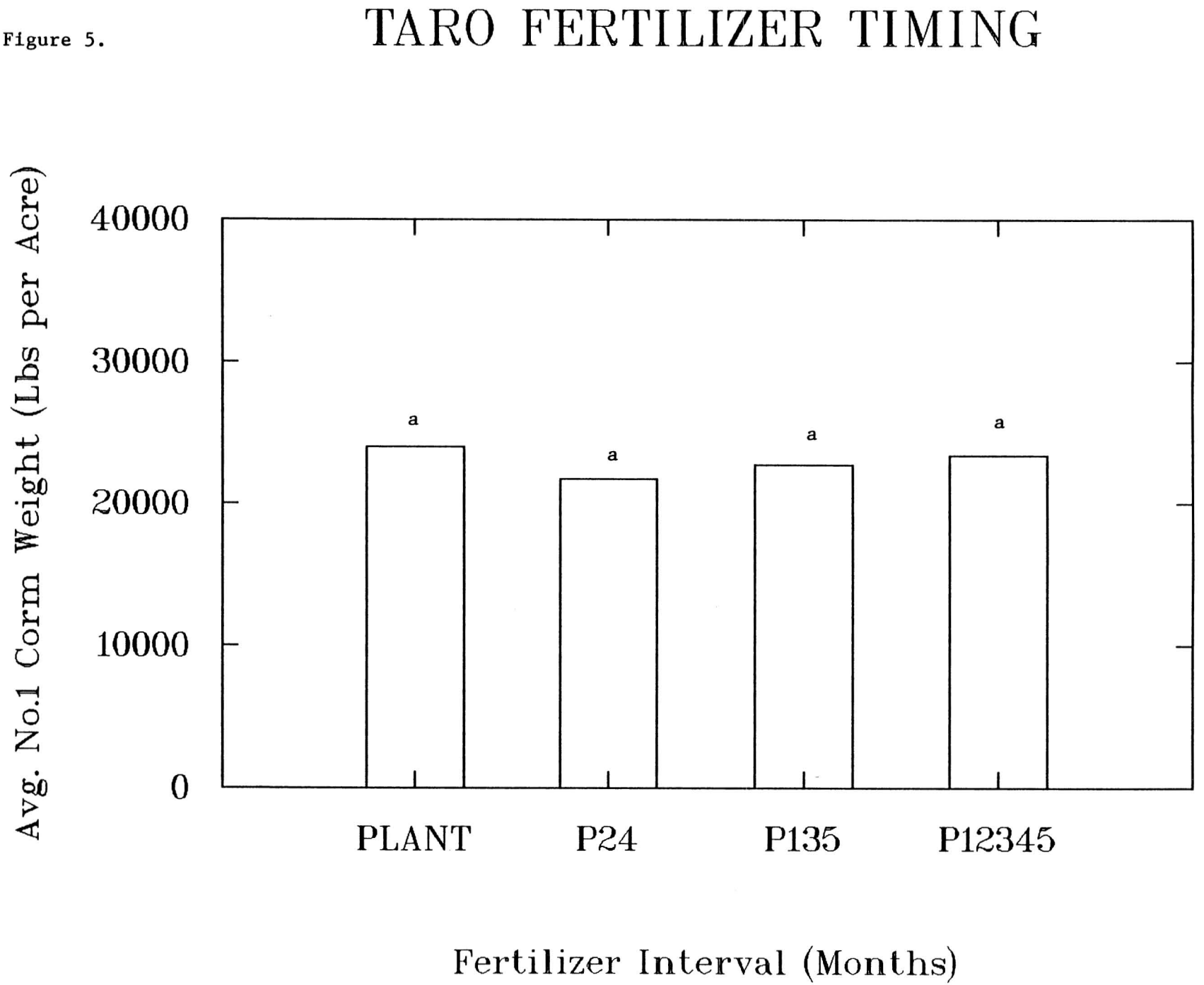


Figure 5.


TARO FERTILIZER TIMING
Avg. No.1 Corm Weight (Lbs per Acre)
40000
30000
20000
10000
0
a
a
a
a
PLANT
P24
P135
P12345
Fertilizer Interval (Months)

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